F/8 Focus Mechanism Upgrade

The existing F/8 focus mechanism has drawn several complaints in past years: slow starts upon movement execution, difficulty attaining a desired focus position, and image motion during focusing. Investigations showed the effects of these problems to be caused by the focus drive system which is an integral part of the central mechanism structure.

The drive system is essentially composed of three independent gear driven screws, set in motion by a single pinion and ring gear. There is notable flexure in the ring gear on start-up and during operation due to the torque required to turn these three gear driven screws. This causes unpredictable and uneven movement at each of the screws which in turn causes collimation and positioning errors. Backlash devices are also underrated for the required torque generated between the pinion and ring gear. Inherent structural flaws in the system also exist. It was therefore decided upon review of the options for correcting these problems to redesign and build a new focus mechanism.

In late 1991 a concept design was presented addressing the above mentioned problems. This concept incorporated a single servo motor, high precision ball screw assembly, transmitting linear motion by means of three block and rail systems, converging to a single motion structure. The advantages being: significantly reduced friction coefficients of the drive system, positive repeatable-incremental moments with finer resolution and positioning accuracy and collimation errors overcome by the use of a single motion structure.

Upon acceptance of this concept, the project was contracted to L&F Industries of Huntington Park California for further development, fabrication and testing. L&F Industries experience in telescope and telescope component fabrication is extensive, providing the facilities and expertise capable of delivering a finished unit.

At this time, the focus mechanism components and central structure have undergone extensive finite element analysis for design optimization. The detail design is nearly complete and the design review process is in progress. Fabrication is expected to begin mid-June and completed by late-September with delivery to CFHT by year's end. Installation is scheduled for the 1993 telescope shutdown.

D. Sabin

TCS IV Update

Progress on TCS IV, while very slow to start with, has been almost non-existent for the last few months. The press of other projects plus the loss of several staff members has put the project essentially on hold. This status will remain until some of the present workload is completed, and the electronics group is again at full staffing. It is hoped the project can be restarted with a full slate of electronics and software participants before the end of 1992.

However, before the work stopped a good amount of progress was accomplished. Three interface cards were designed and built to connect the new VME/vxWorks system to the existing telescope remote buss. All of the low level vxWorks driver code for this interface has been completed. Interrupt service code has been started. The interface between the new system and the R-Buss has been tested on the telescope. Using the driver code and new interface cards we were able to read all the telescope devices, and successfully control a remote motor system. We were also able to verify correct handling of interrupts. This is a big milestone on the move away from the HP 1000 computers. The next milestone is to slew the telescope from the new system.

A complete low-level library has been developed to handle all accesses to the TCS hardware. While coding and initial, emulator testing has been performed, testing on the telescope has not yet taken place. Several other low level systems, such as error handling and a CPU loadmeter have been completed. A prototype user interface for the real time computer has been developed, but is not yet fully implemented. Some conceptual design for higher level modules has been performed. Altogether, about 20% of the Real Time Computer software work has been completed.

Development on improved electronics cards progressed to the point of having a new analog control card ready for testing, and having a completed design for a new digital control card with greatly increased capability. All of the hardware parts of the project are also on hold. A vxWorks driver for the GPIB interface to CAMAC is presently being developed by Mark McDougal, a physics co-op student from University of Victoria, who is working at CFHT through the summer.

The project plan for the completion of TCS IV suggests that slewing of the telescope can be accomplished in 5 months after restart of the project, and that TCS IV can functionally replace TCS III within 12 months after restart. About 2 years will be required for TCS IV to achieve its full, planned functionality. The project needs at least two full time software people, one electronics person, and the part-time services of myself and a software engineer. The overall estimates show 4 man-years of software development, and at least 2 man-years of electronics work will be required to fully complete the project.

B. Cruise

Observatory Communications Software System

A new software system has been developed at CFHT which allows programs on multiple computers to communicate with one another. The software has been dubbed the Observatory Communications System or OCS for short. Currently, it is being used to implement the new CCD software package.

The OCS is meant to be first and foremost, a communications system for processes cooperating in a distributed environment. This arrangement extends itself well to the client-server model which is so useful in today's computing environment. Currently, the new CCD package allows the user interface software on one computer (the client in this case), to exchange messages with a CCD server program, running on a different computer, which is actually controlling the CCD camera.

The goals for the new OCS are to 1) hide explicit knowledge of communications complexities from applications programmers, 2) allow fast status reply ("turn-around") for subsystems, 3) provide a storage facility for observing sequence information, and 4) facilitate distributed processing including remote observing.

Future uses for the OCS might include the TCS user interface computer querying the star-catalog server program, residing on a Sun computer in Waimea, for the nearest guide star. Or perhaps a user interface package, executing on a workstation a continent away, controlling a HP data acquisition system on top of Mauna Kea.

Currently, the OCS functions on both HPUX (revision 7.0) and SunOS (revision 4.1) operating systems. At the heart of the system is a TCP/IP-based software package called MUSIC. This software was originally written by programmers at Lick Observatory and then both ported to HPUX and encapsulated into the OCS at CFHT.

For visiting instruments interested in communicating using the OCS, or communicating with observatory servers, there are specifications and documentation available.

J. Kerr

Limiting Observing Conditions

With an observatory located at approximately 14000 ft. elevation, there are a number of reasons why, from time to time, observations with the telescope have to be curtailed or at worst terminated. Not necessarily in order of frequency or high safety risk, they are as follows:

High Winds

For the last 15 years or so our weather data has been taken from a small tower mounted on top of the dome and about 1 meter from the edge of the slit. Well, last week that tower was severely 'cut down,' ie. from about 3 meters to about .5 meters. No equipment on the tower now projects above the outside surface of the slit edge, hence observations can be done now even if there is ice buildup on the dome. [within reason, of course]. Wind correlation between the old and new tower [situated approximately 50 meters away from our building to the South] have been completed and the only instruments presently mounted at the top of the dome are a relative humidity sensor and a temperature probe. Data from those will continue to be recorded until September 1992. In general, the CFHT closing wind speed, as taken from the new weather tower is 50 knots. [old tower - 65 knots].

Note: Height of old tower = 42 meters; new tower = 15 meters.

Dust

Generally, with high winds we can expect dust. This is normally detected by shining a strong flashlight through the dome slit and if dust is airborne then one can see it. This is normally checked by the T.O. and hence he would determine if conditions were such that the dome shutter has to be closed.

Rain/Snow

If the relative humidity is above 90% and rising then it would be prudent to close the dome and of course close the upper and lower louvers.

Ice

Now that the old weather tower has been 'restructured', the danger of ice falling into the dome slit has been greatly reduced. Nevertheless, caution must still be taken to ensure that ice buildup on the actual shutter is not going to fall into the dome as the shutter opens. There is no diverting lip on the leading edge of the shutter to prevent this.

Power Outages

The local power, i.e. HELCO, has been very reliable to date, since the line across the Saddle Road is usually the last to go down when power cuts or rolling blackouts are occurring. Should we be unfortunate to lose the HELCO power, then we have a very good 250 Kw diesel generator in our building which can be up running and on line within approximately 15 minutes.

Illnesses

From time to time people at the summit [observers - even TOs!] can become ill either from altitude sickness, something they have eaten or just the combined effects of altitude and an illness they had at sea level, now exacerbated by trying to work at 14000 ft. or perhaps still feeling the effects of jet lag. [astronomers arriving from overseas!] in any case, if the observing team is small, then it may mean that the T.O., or vice-versa, will have to transport the person who is ill off the mountain so this would result in the facility being shut down.

Accidents

Fortunately we have not, to date, had any serious accidents at night on our telescope. However, we have had some 'near misses. I strongly advise all staff to be extra careful at nighttime in our dome and building. Obviously the dome is in total darkness and the remainder of the building is illuminated only by adequate lighting. One thing that has to be stressed is that all new observers to our facility must be given a familiarization tour of our dome and building [usually done by the T.O.] before being allowed to carry out procedures, especially in the dome, such as using the P.F. access cage, switching on or off flat field lamps etc. Also there will be NO dome rotations while a person is moving around the dome mezzanine area at night by himself.

Instrument Dimensions

Long or bulky instruments mounted at Cassegrain focus can sometimes require restrictions in Declination pointing, and hence we have some general, 'rule of thumb' criteria to determine possible restrictions. A crude check is to measure from the concrete floor to the underside of the instrument being mounted and if that dimension is less than 1500 mm then the telescope is driven manually North and South to check clearances before any computerized balance programs are done. Other factors that needs to be taken into account when determining clearances are whether the instrument is mounted off axis and will Cassegrain rotation be required.

P. Sydserff